Fe-Cu stable isotope and trace element variations during mantle metasomatism - a study on sulfide blebs from peridotite xenoliths from Nógrád-Gömör Volcanic Field (Northern Pannonian Basin)

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A lherzolitic-wehrlitic xenolith suite was distinguished based on their petrography and geochemistry in the Nógrád-Gömör Volcanic Field (NGVF), located in the northern part of the Pannonian Basin. The lherzolites represent precursors of the melt-metasomatized wehrlites. In this research we focused on the sulfides from both xenolith types in order to understand the behavior of chalcophile and siderophile elements during mafic melt-peridotite reaction applying in situ methods including EMPA and fs-LA-MC-ICP-MS.

Sulfides are more abundant in wehrlites (~0.04 vol. %) and often appear in enclosed textural positions, whereas those in lherzolites (~0.01 vol. %) are dominantly interstitial. Monosulfide solid solution and pentlandite are the most common sulfide phases in lherzolites, whereas pyrrhotite is the most frequent in wehrlites.

Consequently, wehrlitic sulfides show higher bulk Fe, but lower bulk Ni contents compared to the lherzolitic sulfides. In addition, the sulfides in wehrlites are enriched in Zn, Cd, Sb, Tl and depleted in Ge, Se, Te and Re compared to the sulfides in lherzolites. Although δ^{56}Fe signature indicates no Fe isotopic fractionation, we observe metasomatism-related Cu fractionation and δ^{65}Cu between lherzolites (-1.3 to -2.0 ‰) and wehrlites (-0.7 to +1.1 ‰).

In summary, our results reveal that the chalcophile and siderophile elements are strongly affected by melt metasomatism.